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# Load Modules - Multilayer Gigabit Ethernet

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## Load Modules - Multilayer Gigabit Ethernet

The IXIA LM1000LX, LM1000SX, LM1000T and LM1000GBIC are Multilayer Gigabit Ethernet Modules for the IXIA 1600 and 200 chassis. Each module incorporates two fully independent processors that provide extremely powerful and remarkably flexible traffic generation, capture, and filtering capabilities to fully test multilayer Ethernet switches.

### Flexible Packet Generation

- The IXIA Load Modules offer unparalleled traffic generation capabilities, and all packet characteristics are user-configurable:
- Frame and preamble size.
- Source and destination MAC addresses with static, incrementing, decrementing, and random values.
- IP and IPX header contents, including incrementing, decrementing, or random IP addresses. IP checksums are generated on the fly.
- Support for ARP and Ping generation and response.
- Fixed and algorithmic data patterns.
- Four 32-bit, programmable data generators can be inserted anywhere in the frame. Each generator can be configured as multiple 8-bit counters or multiples of 8-bits with incrementing, decrementing, or random data.
- Correct and erroneous checksums.
- Bad CRC and no CRC error generation.
- Full support for ARP, ICMP, IGMP, VLAN, DHCP, IPX, 802.1p, TCP, UDP, RIP, CISCO and pause control frame.
- Hardware support for QoS.

### Real-Time Latency

Real-time latency is calculated in hardware on a packet-by-packet basis. With Ixia's IxExplorer interface, you can configure and view real-time latency graphically at Gigabit speeds. Measured latencies include:

- Instantaneous Latency
- Latency Over Time
- Distributive Latency

### Multi-Users

Multiple concurrent users can own ports. This allows hardware port resources to be shared.

## TCP Traffic Generation

TCP protocol is embedded within hardware allowing thousands of TCP sessions to be established on a single port. Traffic can be generated on a per TCP socket level, allowing real-world flow to be under controlled conditions.

## Choice of Connectors

Four connector types are available, SC Multimode Fiber, SC Singlemode Fiber, RJ45 for 1000 Base-T and GBIC interfaces, providing hot swap for both SC Multimode and SC Singlemode.

## Unique Traffic Generation

The IXIA Load Module can operate in multiple, concurrent modes:

- Stream based
- Flow based

Stream based allows up to 256 streams of data to be traffic generated per port. Each stream allows incrementing, decrementing, random, or fixed MAC and IP addresses, enabling millions of addresses per port.

Flow based allows up to 32,000 traffic flows with any MAC or IP address, enabling thousands of flows per port.

## Extensive Statistics

Each port accumulates statistics in real time, including the number and rate of frames and bytes sent and received, as well as the number and rate of fragments, undersized packets, and Line Errors.

Eight Quality of Service counters are available, which enable QoS for 802.1p, and IP TOS. The module can also define two custom statistics dependent upon source and destination MAC and/or IP addresses, data pattern contents, and error conditions.

## Data Capture

Each port captures up to 4MB of data, or 40,000 64 byte frames. A comprehensive set of triggers and filters is available based on source and/or destination MAC and/or IP addresses, data pattern and error conditions. Decodes for IP, UDP, ARP, TCP, DHCP, IPX, RIP, IGMP are also available.

## Load Module Specifications

	<b>LM1000LX, LM1000SX, LM1000T, LM1000GBIC</b>
<b>Number of ports / Module</b>	<b>2</b>
<b>Connector Type</b>	<b>LM1000SX: SC Multimode Fiber</b>

	LM1000LX: SC Singlemode Fiber LM1000T: RJ45 LM1000GBIC: GBIC
Statistics and Rates Counter size : 64 bits Maximum count: 1.84 x 10 <sup>19</sup>	Link State, Line Speed, Duplex Mod Frame Sent, Valid Frames Received Byte Sent/Received, Fragments, Undersize, Oversize, FCS Errors, VLAN Tagged Frames, Line Errors, Flow Control Frames, Oversize and CRC Errors, Line Error Frames, Byte Alignment Errors, User defined statistics, Capture trigger, Capture filter and 8 QoS statistics
Capture Buffer (per port)	4MB (40,000 frames)
Error Generation	CRC-good, bad, none, undersize, oversize
Number of streams/port	256
Number of flows/port	32,000
MAC source and destination	Fixed, increment, decrement or random, with user defined Override (mask) to force any bit(s) to 1 or 0
Frame Length	Fixed, random (specify min./max.), increment from 40 bytes to 64KB
Data field	All 1s, all 0s, alternating 1s/0s (by bit 2 bits, nibble, byte, 2 bytes) increment decrement, random, user-specified data
Interframe Gap	From 64ns to 1 min in 16ns increments, random
Interburst Gap	From 64ns to 1 min in 16ns increments
Interstream Gap	From 64ns to 1 minute in 16ns increments
Filters	48-bit source/destination address, 3- bit frame type, 2x 128-bit user-

	definable pattern and offset, frame length range, CRC error, line error, line error+bad CRC, line error+good CRC, good/bad packet
IP, UDP, TCP	Hardware checksum generation
VLAN	Statistics and generation of 802.1p, VLAN frames
Flow Control	Statistics, response and generation 802.3x Flow Control frames
Auto negotiation	Fully supported
Latency measurements	20ns resolution
Trigger out	1 user-selectable per port
Capture Data Replay	Up to 32,000 data flows

Contact Ixia Communications for information about the Ixia family of products.

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